

10CFR50.73

June 13, 2012

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Limerick Generating Station, Unit 1  
Facility Operating License No. NPF-39  
NRC Docket No. 50-352

Subject: LER 2012-002-00, Valid Actuation of the Reactor Protection System with  
the Reactor Critical

This Licensee Event Report (LER) addresses a valid actuation of the reactor protection system when the reactor was critical. The event was due to a failure of a 13 kV/480VAC transformer and subsequent low voltage condition that resulted in a loss of the main generator stator cooling water system. The loss of stator water cooling resulted in an automatic trip of both reactor recirculation pumps which required a manual actuation of the reactor protection system.

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A).

There are no regulatory commitments contained in this letter.

If you have any questions, please contact Robert B. Dickinson at (610) 718-3400.

Respectfully,

Original signed by

F. A. Kearney  
Vice President – Limerick Generating Station  
Exelon Generation Company, LLC

cc: Administrator Region I, USNRC  
USNRC Senior Resident Inspector, LGS

(See reverse for required number of digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects.resource@nrc.gov](mailto:infocollects.resource@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

4. TITLE	Valid Manual Actuation of the Reactor Protection System Due to Reactor Recirculation Pumps Tripping
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9. OPERATING MODE		11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
1	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)	
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)	
10. POWER LEVEL	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)	
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)	
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER	
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A	

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT										
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	EA	XFMR	258A	Y						

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

A failure of a 13 kV/480 VAC transformer and subsequent low voltage condition resulted in a loss of the main generator stator cooling water system. The loss of stator water cooling resulted in an automatic trip of both reactor recirculation pumps which required a valid manual actuation of the reactor protection system. The transformer failure was caused by partial current discharge (corona effect). The partial current discharge was caused by a manufacturing defect and a polymer insulating board degradation. A contributing cause was dust, debris, and environmental factors internal to the 144D transformer housing. The preventive maintenance frequency for cleaning the transformer was not consistent with the environmental factors at the transformer. The transformer area was cleaned. The transformer will be repaired or replaced and returned to service. The frequency of the periodic preventive maintenance activity to clean and examine the transformer will be increased.

**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

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**NARRATIVE**

Unit Conditions Prior to the Event

Unit 1 was in Operational Condition (OPCON) 1 (Power Operation) at approximately 100% power. There were no structures, systems or components out of service that contributed to this event.

Description of the Event

On Thursday, April 19, 2012, Limerick Unit 1 was operating at approximately 100% power. At 0753 hours, a valid manual actuation of the reactor protection system (EIIS:JC)(RPS) was initiated as directed by the Recirculation Pump Trip procedure (OT-112) due to an automatic trip of both reactor recirculation pumps (EIIS:AD)(RRP) following a loss of main generator stator cooling water. The event was caused by a failure of a 13 kV/480 VAC transformer (EIIS:XFMR) that supplies electrical power to the 144D non-safeguard 480 VAC load center. The 13 kV breaker that tripped was the supply to 114A and 144D load centers.

The operators entered the TRIP procedure for reactor pressure vessel (RPV) control (T-101) and stabilized reactor parameters. The operators verified that all control rods were fully inserted.

Reactor level initially decreased to a minimum of -3 inches and increased to a maximum of +42 inches. The +54 inch high-level turbine trip setpoint was not exceeded. The reactor level of less than +12.5 inches resulted in an isolation signal to the closed Group IIB valves as expected.

The pre-transient reactor pressure was 1041 psig. The maximum pressure observed was 1041 psig and minimum pressure observed was 950 psig during the transient. Reactor pressure remained less than the lowest safety relief valve (SRV) setpoint of 1170 psig; therefore, no SRVs actuated. The main steam bypass valves opened as designed to control pressure.

A brief low voltage condition on 124A load center caused by the electrical transient resulted in the tripping of the operating stator water cooling pump. The standby stator cooling water pump did not automatically start due to a loss of power to the 114A load center. Both reactor recirculation pumps tripped following the stator cooling water runback as designed.

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The post-scrum troubleshooting identified a fault on the transformer supplying the 144D load center. The 114A and 144D load center 480 VAC loads were re-energized after closing the load center tie breakers.

A 4-hour NRC ENS notification was required by 10CFR50.72(b)(2)(iv)(B) for an actuation of RPS when the reactor was critical. An 8-hour NRC ENS notification was required by 10CFR50.72(b)(3)(iv)(A) for a valid actuation of RPS. The ENS notification (#47850) was completed on Thursday, April 19, 2012 at 1110 EDT. This event involved a manual actuation of RPS. Therefore, this LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A).

**Analysis of the Event**

There was no actual safety consequence associated with this event. The potential safety consequences of this event were minimal. A loss of both recirculation pumps transient is categorized as an incident of moderate frequency per the Updated Final Safety Analysis Report (UFSAR) section 15.3.1 Recirculation Pump Trip, subsection 15.3.1.1.2.2. The plant equipment performed as designed during the transient. The operators effectively stabilized reactor parameters.

The 13 kV breaker that tripped was the normal supply to both 114A Generator Area Load Center and 144D Technical Support Load Center. The 124A load center remained energized. The 1B Generator Stator Cooling Pump is powered from 124A load center and was operating when the transformer failed. The subsequent low voltage condition caused the 1B Generator Stator Cooling Pump to trip. The 114A load center trip de-energized the standby 1A Generator Stator Cooling Pump. This resulted in a loss of stator cooling water to the main generator.

Both RRP's tripped on the loss of stator cooling water runback. The operators initiated a manual actuation of RPS which inserted all the control rods.

The transformer fault was caused by partial current discharge (corona effect) where the High Voltage (HV) rods pass through the support board.

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**NARRATIVE**

Cause of the Event

The initiating event was a failure of a 13 kV/480 VAC transformer power supply to a load center due to partial current discharge (corona effect). The partial current discharge was caused by a manufacturing defect and a polymer insulating board degradation. A contributing cause was dust, debris, and environmental factors internal to the 144D transformer housing. The preventive maintenance frequency for cleaning the transformer was not consistent with the environmental factors at the transformer.

Corrective Action Completed

The 114A and 144D load center 480 VAC loads were re-energized by closing the load center tie breakers.

The 144D transformer area was cleaned.

Corrective Action Planned

The faulted transformer will be repaired or replaced and returned to service.

The frequency of the periodic preventive maintenance activity to clean and examine the 144D transformer will be increased.

Previous Similar Occurrences

There were three recent previous similar occurrences of reactor recirculation pump trips that resulted in manual actuations of RPS.

1) Unit 1 LER 2010-001-00 reported a failure of a 13 kV cable that resulted in a loss of stator cooling water and a trip of both reactor recirculation pumps which resulted in a manual actuation of RPS.

2) Unit 2 LER 2011-002-00 reported a stator cooling water high temperature actuation that resulted in a loss of stator cooling water and a trip of both reactor recirculation pumps which resulted in a manual actuation of RPS.

3) Unit 2 LER 2011-005-00 reported a main turbine first stage pressure instrument failure that tripped both reactor recirculation pumps which resulted in a manual actuation of RPS.

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**NARRATIVE**

Component data:

System: 13 KV System

Component: 144D Transformer, Technical Support Center

Manufacturer: 258A ASEA, Brown Boveri

Serial number: 24-29417